

Bavarian Academy in 1899. This volume was translated into English by the author's distinguished pupil, Mrs. Maria Ogilvie-Gordon, and issued in a slightly abbreviated form in Mr. Walter Scott's Contemporary Science Series in 1901. It will always remain a standard work of reference.

Prof. von Zittel naturally received numerous honours. Many years ago he became a Privy Councillor, and from 1899 until his death he was president of the Royal Bavarian Academy of Sciences. He was elected a foreign member of the Geological Society of London in 1889, and received the Wollaston medal in 1894. He was made a foreign associate of the United States National Academy of Sciences in 1898, and a correspondent of the Paris Academy of Sciences in 1900. His greatest joy was the ardent friendship with which he was honoured by his former pupils scattered through nearly all the civilised nations of the globe.

A. S. W.

### NOTES.

THE fifth International Congress of Zoology, held at Berlin in 1901, selected Switzerland as the place of meeting for the sixth session, and elected Prof. T. Studer president. In accordance with this resolution, the congress will meet at Bern from August 14-19 of this year. Prof. Studer, Bern, is president of the general committee, and the vice-presidents are:—Prof. E. Beraneck, Neuchâtel; Prof. H. Blanc, Lausanne; Dr. V. Fatio, Geneva; Prof. L. Kathariner, Fribourg; Prof. A. Lang, Zürich; Prof. E. Yung, Geneva; Prof. F. Zschokke, Basel; and Prof. R. Blanchard, Paris. The secretaries are Prof. M. Bedot, Geneva; Dr. J. Carl, Geneva; and Dr. W. Volz, Bern. The general meetings will be held in the Palace of Parliament at Bern, and the sectional sittings in the new university. During the congress there will be an excursion to Neuchâtel and to the Jura lakes, in order to visit the lake-dwellers' settlements. The closing meeting of the congress will be held at Interlaken. Afterwards the members of the congress will be invited to visit other Swiss cities. Communications or inquiries referring to the congress should be addressed to the president of the Sixth International Congress of Zoology, Museum of Natural History, Waisenhausstrasse, Bern. The congress is open to all zoologists and to all who are interested in zoology.

THE *Atti* of the Lincei Academy announces the death, on November 25, of Angelo Maffucci, a member of the Academy since July, 1900.

A NEW Pasteur Institute has, says the *British Medical Journal*, been established at New Orleans, where the anti-rabic treatment will be carried out without any expense to the patients.

It is announced that Dr. Felix Kanitz died at Vienna on January 5. Dr. Kanitz, who was born at Budapest in 1829, was well known for his archæological and ethnographical labours in the Balkan peninsula.

It is reported that the Goodwin Sands lightships are to be put in communication with the shore by means of wireless telegraphy, and that the installation is to be completed in about a month. Four lightships will communicate with the Admiralty wireless telegraphy station near Shakespeare Cliff, Dover.

LIEUT. E. H. SHACKLETON, late third lieutenant of the *Discovery*, and one of the three men who reached furthest south in a journey from the ship, has been appointed secre-

tary of the Royal Scottish Geographical Society in succession to Lieut.-Colonel F. Bailey. Lieut. Shackleton had to be invalided home from the Antarctic on account of hæmorrhage of the lungs.

THE death is announced of Dr. F. von Hefner-Alteneck, a member of the Berlin Academy of Sciences and a well-known engineer. Dr. von Hefner-Alteneck was born at Aschaffenburg in 1845. After studying at Munich and Zurich he entered the firm of Siemens and Halske, with whom he remained until 1890. He became chief engineer of the firm, and was the inventor of many electric appliances produced by that house.

THE Geological Society of London has this year awarded its medals and funds as follows:—the Wollaston medal to Prof. Albert Heim, of Zurich; the Murchison medal to Prof. G. A. Lebour; the Lyell medal to Prof. A. G. Nathorst, of Stockholm; the Wollaston fund to Miss E. M. R. Wood; the Murchison fund to Dr. A. Hutchinson; the Lyell fund to Prof. S. H. Reynolds and Dr. C. A. Matley; the Barlow-Jameson fund to Mr. H. J. L. Beadnell.

BARON ERLAND NORDENSKJÖLD, who left Southampton on January 6 on an expedition to Bolivia, informed a representative of Reuter's Agency that the expedition would last at least eighteen months, as he intended to penetrate the northern forests of Bolivia for the purpose of studying the hostile Indian tribes along the various tributaries of the Amazon, and the region to be traversed was practically unknown. He is accompanied by Lieut. D. de Bildt, a son of the Swedish Minister in London, and Dr. Holmgren.

At a meeting on January 5, the Bath City Council had under consideration a letter from the National Trust relative to the quarrying in the Cheddar Cliffs, and unanimously adopted the following resolution:—"That this council has heard with sincere regret of the damage which is being caused to the Cheddar Cliffs by the quarrying of stone therefrom, and other works connected with such quarrying, and trusts that steps may promptly be taken for preserving in its original condition, so far as practicable, this most picturesque and interesting feature of the West of England." Similar resolutions have also been passed by the Somerset County Council and other public bodies in the district.

DR. NORDENSKJÖLD and the members of his South Polar Expedition arrived at Hamburg on January 6. The unexpectedly early return from the South Polar regions of this expedition has, the *Times* states, enabled Dr. Jean Charcot to recast the plans of the French expedition on board the *Français*. He now proposes to explore the west coast of Graham Land and to carry out a very exhaustive scientific investigation of that region. From Flanders Bay, at the south-west end of Belgica Strait, Dr. Charcot intends to push south in the direction of Pitt Island and Adelaide Island, with Alexander Land as the great goal of the expedition's efforts. With the return of the Antarctic spring, if winter quarters have been taken up far enough south, Alexander Land will be the objective of these parties; otherwise the excursions will be undertaken with the object of linking up the work of the French expedition with that which Dr. Nordenskjöld and his companions have accomplished, working from the other, or eastern, side of the land masses in this part of the Antarctic region. It is Dr. Charcot's definite intention to return at the end of the season of 1904-5. The *Français*, indeed, is only provisioned for two years, and Dr. Charcot states that if the expedition does not return in the early months of 1905, it must be concluded that they have been involuntarily detained, and a relief vessel must be dispatched to their assistance.

THE Board of Education, in cooperation with the council of the Society of Arts, intends during the present year to hold, in the Victoria and Albert Museum, South Kensington, an exhibition of engravings produced by mechanical means, such as photogravure and other photographic processes, as a sequel to the exhibition of engraving and etching held during last summer; and as great advancements have been made in printing in colours since the Exhibition of Modern Illustration in 1901, specimens of colour printing will be included. A committee, of which Sir William de W. Abney, K.C.B., F.R.S., will act as chairman, has been formed to advise the Board in carrying out the exhibition. All communications should be addressed to the secretary, Exhibition of Mechanical Engraving, Board of Education, South Kensington.

At the monthly meeting of the Church Society for the Promotion of Kindness to Animals, held on Friday, January 8, at the Church House, Westminster, it was resolved to present a memorial to the Government asking for a departmental inquiry into the conditions under which slaughtering is carried on, and the general treatment of animals. A paper was read on "Nature-Study Conducive to Kindness to Animals" by the Rev. Claude Hinscliff.

MR. J. A. GILRUTH, pathologist to the Public Health Department, Wellington, N.Z., is reported to have made a new discovery with regard to anthrax (*Times*, January 11). The series of experiments which he has conducted proves that an animal particularly susceptible to anthrax, such as a guinea-pig or a rabbit, will resist enormous doses of virulent anthrax provided the anthrax germs be mixed with a greater quantity of another species of microbe that in itself must be non-pathogenic and incapable of producing any disease. These observations may ultimately prove to be of practical importance, and their confirmation will be awaited with interest.

PROF. A. KLOSSOVSKY, of the University of Odessa, and director of the meteorological system of south-west Russia, has published in vol. xxv. of the *Journal* of the New Russian Society of Naturalists a very interesting *résumé* of the general condition of weather prediction at the present time. He deals with the old method of mean values and the modern method of synoptic meteorology, the application of mathematical analysis, with periodicities (varying from two to thirty-five, and even one hundred and thirty-five years), the moon's influence, &c. The chief object of the paper is to examine the method of M. Demtschinsky and the predictions published for some years in the journal *Climate*. The predictions in question have been submitted to an exhaustive examination, and Prof. Klossovsky's conclusions are entirely unfavourable to M. Demtschinsky's method and results. For the benefit of meteorological students the author suggests that, if M. Demtschinsky persists in his views, the matter should be referred to the independent decision of the International Meteorological Committee, and that the necessary funds should be placed at its disposal for the preliminary work of calculation and preparation of diagrams.

EVERY photographer who washes his negatives carefully is aware of the great expenditure of water and time required before he is satisfied that the last trace of hyposulphite of soda has been dissolved. Four hours is sometimes given as the length of time necessary, but usually one hour is considered sufficient. Mr. J. Norton, in the *British Journal of Photography* (January 1), suggests an alternative scheme for getting rid of the hypo

in five minutes, and as he says he has given some attention to this question, his process may be summarised here. The basis on which the suggestion is made is that barium chloride has an exceedingly strong affinity for sulphur. On the addition of barium chloride to hyposulphite of soda both are immediately broken up; the barium unites with the sulphur and the soda with the chlorine, so that the products are barium sulphate and common salt. The barium sulphate being loose, very heavy, white (poisonous) powder, quite insoluble, can be easily rinsed off the photographs, and the common salt remains in the solution. After the photograph has been taken from the hyposulphite of soda solution, it should be rinsed in running water for a minute and rubbed on both sides with a cotton swab. It should then be dipped for two minutes in a 5 per cent. solution of barium chloride, and afterwards rinsed and swabbed in running water. Mr. Norton finds that five minutes is sufficient for this latter manipulation. He also remarks that the whites of the photographs are improved by this process.

Two small booklets on "Color Correct Photography" and "How a Lens Works," belonging to the "Photogram Series of Penny Pamphlets on Photography," have been received from the publishers, Messrs. Dawbarn and Ward, Ltd. The first contains some facts about isochromatic and orthochromatic methods which will aid the photographer to improve his work both from the technical and pictorial points of view. The second tells one what the lens can and cannot do, and gives in simple language various pieces of information useful to a beginner. This useful series of pamphlets will no doubt find many readers.

AN account of the development of mathematics during the nineteenth century is contributed by Dr. J. T. Merz to the *Proceedings* of the Durham University Philosophical Society.

In a paper contributed to the *Physikalische Zeitschrift*, iv., 30, by Messrs. R. Luther and W. A. Uschkoff on the chemical action of Röntgen rays on bromide-gelatin photographic plates, the authors arrive at the conclusions (1) that the action of these rays is specifically different from that of ordinary light; (2) that short exposure to Röntgen rays alters the sensitiveness of the plates to ordinary light, sometimes increasing and sometimes decreasing it; (3) that previous illumination with ordinary light does not affect the behaviour of bromide plates towards Röntgen rays.

SEVERAL papers have recently appeared dealing with the study of ultra-microscopical particles. In the *Revue générale des Sciences* MM. A. Cotton and H. Mouton give a general account of the recent researches of Siedentopf and Zsigmondy, and Mr. E. Raehlmann, of Weimar, contributes to the *Physikalische Zeitschrift* the results of his researches on the ultra-microscopic particles contained in solutions of colouring matters, these researches having been carried out with the aid of the instrument belonging to the Zeiss Laboratory in Jena.

THE recent attempts of engineers and others to grapple with thermodynamical problems falling more strictly within the domain of the physicist have led to the publication of a paper by Prof. W. S. Franklin in *Science* for November 20, 1903, on the misuse of physics by biologists and engineers. In discussing irreversible processes, the author introduces the new nomenclature of "steady sweeps," "trailing sweeps," and "simple sweeps," and he maintains the view (rightly or wrongly) that the conception of *temperature* has no meaning except in cases of thermal equilibrium.

FROM the Gesellschaft für drahtlose Telegraphie we have received reprints of papers from the *Elektrotechnische Zeitschrift* dealing with a new detector for wireless telegraphy and a new measurer for electric waves. The detector, which is described by Mr. W. Schloemilch, depends on the property that when electric waves fall on a polarised electrolytic cell placed in circuit with a source of current of slightly higher E.M.F., the current in the circuit is increased either owing to a decrease of the resistance due to polarisation or from some other cause. The name "System Telefunken" has been given to this new method of wireless telegraphy.

IN *Science* for December 18, 1903, Dr. G. F. Kunz and Prof. C. Baskerville describe a series of observations made on the conduct of the gems and gem material of the Tiffany Morgan collection, and on several other collections of diamonds, under the influence of radium, Röntgen rays, and ultra-violet light. The fluorescence and phosphorescence were tested for more than 13,000 verified minerals. Seeing that three different kinds of radiation are considered, and that a mineral may respond or fail to respond to any one of them, the "number of ways" (to quote the familiar question on permutations) is eight, and the authors propose a tentative classification of minerals based on these eight ways. It is further pointed out that we have here a series of discriminating tests which may be readily applied to various minerals with the use of comparatively simple apparatus.

ON March 16, 1882, the late Prof. Adolfo Bartoli communicated a sealed packet to the Accademia dei Lincei, of Rome. This packet was opened at the meeting of the mathematical and physical section on February 1 of last year, and found to contain a paper on the transformation into electric currents of the radiations falling on a reflecting surface in motion. In this paper, which is published in the *Atti dei Lincei*, xii., 9, the author discusses a method, previously described, of conveying radiation from a cold body to a hot one by means of deformable reflectors, and among the various kinds of forces necessary to reconcile this result with thermodynamics, the author suggests pressure due to radiation, and the production of tangential currents when a reflecting surface is rotating rapidly in sunshine. It is interesting to note that the first explanation, which is now well established, led in Bartoli's time to no conclusive results, while his experiments clearly indicated the existence of the currents required for the second explanation.

A LIST of the flora of the Valle Anzasca (Macugnaga), on the Italian side of Monte Rosa, is given by M. Francesco Ardissonne in the Lombardy *Rendiconti*. The valley in question, which is rarely if ever explicitly mentioned in botanical works, is remarkable for its large representation of the order Crassulaceæ, and in addition the author describes a new species of Androsace under the name *A. heterophylla*.

IN the *Memoirs* of the Boston Society of Natural History Prof. Jeffrey has published the first of a series of memoirs which will be devoted to the comparative anatomy and phylogeny of the Coniferæ. The genus *Sequoia* forms the subject of this paper, and considerable importance is attached to the distribution of the resin ducts. A similar distribution is found to occur in species of the genus *Abies*, whence Prof. Jeffrey is led to postulate the derivation of the living *Sequoias* from an abietineous stock.

THE experiment of fixing a seed to the side of a dish containing mercury so that the root of the seedling may

force its way downwards into the mercury is a common one. It is not generally known that with certain seeds the penetration of the roots into the mercury may be effected without any fixation beyond the film of water which must be placed on the mercury to keep the root moist. In the *Proceedings* of the Amsterdam Royal Academy of Science Mr. P. van Harreveld discusses the controversies which have arisen out of this experiment, originally performed by Pinot in 1829. In a paper from the same source Dr. and Mrs. Th. Weevers bring forward evidence to show that alkaloids are formed synthetically in the young parts of such plants as tea, coffee, and cacao, and that in older parts they are wanting; the conclusion is that they are used up in metabolism.

HAVING regard to the present and future condition of the cotton industry in this country, very great interest attaches to the results of the trials which are being made to introduce the cultivation of cotton into our colonies. For the benefit of those disposed to take up cotton growing in the West Indies, the Imperial Commissioner of Agriculture has brought together in the last number of the *West Indian Bulletin* a series of articles dealing with the cultivation, chemistry and diseases of cotton. A point of primary importance is the careful selection of seed, for not only has the Sea Island cotton been improved by judicious selection, but the Rivers variety, which is resistant to the wilt disease, was obtained in the same way. Experimental plots were only started in St. Kitts, Antigua, Montserrat, and Barbados last year, so that it is too early as yet to obtain trustworthy data.

CAPTAIN STANLEY FLOWER has favoured us with a copy of the second edition of the "Guidebook" to the Zoological Gardens under his care at Giza, near Cairo. A brief account of many of the more interesting species in the collection is given. It is satisfactory to learn that the three specimens of the shoe-billed stork are still thriving.

THE January number of the *Entomologists' Monthly Magazine* contains several items of special interest. In one note Prof. T. H. Beare records the occurrence in two localities of a foreign beetle (*Ptinus teetus*) recently introduced into this country. The native home of this beetle is apparently Tasmania, but one of the introduced colonies came from the Levant. In another communication Mr. N. H. Joy records a Russian beetle, *Euconus maeklini*, as British. Mr. W. E. Clarke, in recording several kinds of insects—chiefly moths—observed at the Eddystone Lighthouse, touches a practically new subject, namely, the wanderings and migrations of insects.

MR. P. W. STUART-MENTEATH has sent us a pamphlet on "Pyrenean Geology, part I., the Alpine Paradoxes" (Dulau and Co., 1903, price 1s.). This is a controversial essay on the structure of the Alps and Pyrenees, and on errors in the geological maps of those regions.

THE *Journal* of the Royal Microscopical Society for December, 1903, contains the usual summary of current researches relating to zoology and botany (principally Invertebrata and Cryptogamia), microscopy, &c., and in addition there is part xv. of Mr. F. W. Millett's report on the recent Foraminifera of the Malay Archipelago.

THE fossil echinoids of Japan have been described by Mr. S. Tokunaga (formerly Yoshiwara), the species being illustrated by four plates (*Journ. Coll. Science, Tokyo*, vol. xvii., art. 12, 1903). No echinoids have been found in the Palæozoic strata of Japan; the Mesozoic strata have yielded *Pygurus*, *Toxaster*, *Cidaris*, *Pseudocidaris* and *Hemici-*



daris (?); and eighteen genera are recorded from the Cainozoic series. Most of these last-named genera are still living, and some of the species have a wide geographical distribution and a considerable range in Tertiary time.

MR. A. LUCAS has prepared, for the Public Works Ministry at Cairo (1903), a report on the soil and water of the Wadi Tumilat lands. It appears that this alluvial tract formed part of "the land of Goschen," and was a fertile tract until ruined by the Ismailia Canal. The author points out that this high-level canal passes through a porous soil, and the seepage-water has not only raised the general level of the subsoil water, but has brought to the surface in many places salts of soda which have proved more or less injurious, the sodium carbonate being most harmful to vegetation. Wind also helps to distribute the efflorescent salts. The remedy consists in a thorough system of drainage, and in frequent washing of the land.

WE have received a copy of the "New and Revised Edition of a Geological Map of the Southern Transvaal," by Dr. F. H. Hatch (Stanford, price 20s. in sheet, 25s. in case), with explanatory pamphlet (1903). The scale of the map is a little more than four miles to an inch, and it includes an area bounded on the north by Pretoria, on the west by Ventersdorp and Klerksdorp, on the south by the Vaal River, and on the east by Greylingstadt and Heidelberg. It is very clearly printed in colours, and the farm boundaries are shown. Although admittedly a sketch-map, it will be of great service in representing the present state of knowledge with regard to the extent of the coal-bearing strata, the auriferous rocks and other mineral resources, not to mention the Dolomite series, which is economically of great importance as the source of perennial streams and as furnishing the present water-supply of Johannesburg.

SYSTEMATIC and distributional arrangements of the genus *Polygonum* in India have been prepared by Captain Gage, and are published in the *Records* of the Botanical Survey of India. The horizontal distribution of the species throughout certain sub-subareas of India compared with their distribution in other countries is well shown in one set of tables, and another set indicates the vertical distribution. From the latter it will be observed that *Polygonum viviparum* shows the greatest vertical range, namely, from 4000 to 17,000 feet; *Polygonum tortuosum* and *Polygonum sibiricum* reach to the same upper limit, but are not found below 11,000 feet.

IN the notice of "Le Point critique des Corps purs" in last week's NATURE (p. 217) it should have been stated that the author of the book is Prof. E. Mathias.

MESSRS. WATTS AND CO. have issued for the Rationalist Press Association sixpenny editions of "Science and Speculation," by Mr. C. H. Lewes, and of Mr. Edward Clodd's "Story of Creation." The latter volume contains eighty-six illustrations and tables.

THE Brin Oxygen Companies, the London address of which is now Elverton Street, Westminster, S.W., have issued a convenient little diary which is provided with much useful information. Not only are full particulars of the prices of the apparatus made by the companies and of the compressed gases supplied by them included, but also a series of hints to users of compressed gases in the form of medical notes, notes for lanternists, for blowpipe users, and on extreme refrigeration. In addition, the booklet contains a cylinder record and instructions for using liquefied carbon dioxide.

WE have just received an advance copy of Merck's English catalogue of fine chemicals. The list of chemicals is very comprehensive, and is probably the most complete published in this country. We note that Merck's present factory in Darmstadt will soon be replaced by entirely new works, now in course of erection.

IN the current number of the *American Journal of Science* Mr. J. C. Blake points out that soluble silver compounds are formed in the preparation of colloidal silver solutions by sparking between silver electrodes under water. It seems probable to the author that these compounds may play an important part in the peculiar actions exhibited by colloidal metal solutions, which, from the similarity of their behaviour to that of ferments, have been styled by Bredig inorganic ferments.

IN the *Proceedings* of the American Academy of Arts and Sciences Mr. G. P. Baxter describes some further experiments relative to the atomic weight of iron, an entirely new method—the analysis of ferrous bromide—being employed. These new experiments confirm the result, 55.88, previously obtained by Richards and Baxter for the atomic weight by the reduction of the oxide, and indicate that the value, 56.0, usually employed is appreciably inaccurate.

A NEW form of electrical resistance furnace was described by Dr. Frölich at the last meeting of the German "Bunsen" Society for Applied Physical Chemistry. Instead of employing carbon cores as the immediate source of heat, the sides of the furnace itself are utilised, the furnace being constructed of some specially suitable material the nature of which has not been divulged. The mean temperatures reached in a core furnace and in that described by the author under comparative conditions were found to be 1200° and 1600° C.

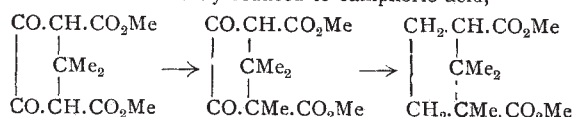
THE first number of a new review, the *Physikalisch-chemisches Centralblatt*, has just been issued. It is not intended as a medium for the publication of original work, but as a comprehensive centralising review of progress in physical chemistry, the extraordinarily rapid rise and development of which during the last decade is almost unique in the history of science. The abstracts are to appear either in German, English, or French, and, so far as possible, will be furnished by the authors themselves. The review will be issued twice a month, and will no doubt be a valuable aid to the numerous chemists who desire to keep abreast of physicochemical literature.

THE oxidation of phosphorus is a reaction which, in spite of its apparently simple nature, exhibits many anomalies. The rate of oxidation increases as the pressure diminishes, and no completely satisfactory explanation of this apparent exception to the law of mass action has yet been given. In the current number of the *Journal* of the Chemical Society Mr. E. J. Russell contributes a further series of observations on the subject. It appears that the presence of a small quantity of water is necessary for the oxidation, and that the quantity left after drying with sulphuric acid is that which allows reaction to proceed most rapidly. The results of experiments carried out at higher pressures contradict the usual statement that phosphorus only reacts with oxygen at low pressures, and the author finds that the reaction in these circumstances is in agreement with the mass action law.

A NOVEL reducing agent is described by Dr. Stoermer in a recent number of the *Berichte*. He has found that in a considerable number of cases compounds containing the group  $\text{—CH}_2\text{.CO—}$  are reduced by heating with phosphorus

tribromide to unsaturated compounds containing the group  $-\text{CH}:\text{CH}-$ . Thus desoxybenzoin,  $\text{C}_6\text{H}_5\cdot\text{CH}_2\cdot\text{CO}\cdot\text{C}_6\text{H}_5$ , is reduced to stilbene,  $\text{C}_6\text{H}_5\cdot\text{CH}:\text{CH}\cdot\text{C}_6\text{H}_5$ , and diphenylpyrazolone to diphenylpyrazole. The method is also applicable to some compounds containing the group  $-\text{NH}\cdot\text{CO}-$ , and carbostyryl is in part reduced by phosphorus tribromide to quinoline.

THE long sought synthesis of camphoric acid has been recently accomplished by Dr. Komppa, of Helsingfors (Finland), and is described in the *Berichte* of December 29, 1903. Two years ago the author described the synthesis of apocamphoric acid, which differs from camphoric acid only in the presence of a hydrogen atom in place of one of the methyl groups. The methyl group cannot be introduced directly into apocamphoric acid, but the diketo-apocamphoric ester can be methylated and yields a diketocamphoric acid which can be indirectly reduced to camphoric acid,



The synthetical acid is optically inactive, but proved to be identical with the known racemic form of camphoric acid. The synthesis includes also the preparation of camphor from its elements, since the conversion of camphoric acid into camphor was accomplished some years ago by Haller. Although the correctness of Bredt's formula for camphor has been fully established by the synthesis of several of its oxidation products, the synthesis of the ketone itself has for some years been one of the most attractive problems in organic chemistry, and its solution completes a not unimportant chapter in the history of chemical progress.

THE additions to the Zoological Society's Gardens during the past week include a Raven (*Corvus corax*), British, presented by Mr. George Ogilvie; a Mongoose Lemur (*Lemur mongoz*) from Madagascar, two Sulphury Tyrants (*Pitangus sulphuratus*) from South America, deposited; a Llama (*Lama peruana*), born in the Gardens.

### OUR ASTRONOMICAL COLUMN.

DISTRIBUTION OF THE STARS.—No. 5, vol. xlviii., of the Harvard College Observatory *Annals* contains a discussion of the distribution of the stars throughout the whole sky. A special point of the discussion was to determine the relative numbers of the stars situated in the Milky Way and those outside its limits. The number of stars in the galaxy was determined from the charts given in Heis's atlas and the Uranometria Argentina; those without were determined from the Harvard Durchmusterungs. Twenty-three tables included in the paper set out the various results in detail, but the following are among the chief facts determined.

The number of stars in a given area of the Milky Way is about twice as great as in an equal area of any other region, and this ratio does not increase for faint stars down to the twelfth magnitude; the proportion of stars of any given magnitude is the same in the Milky Way as in the other regions. The Milky Way covers about one-third of the sky, and contains about half of the stars. There is no evidence of any limit to the faintness of the stars, although the proportionate increase becomes less for each successive magnitude. There are about 10,000 stars of magnitude 6.6 or brighter, 100,000 of magnitude 8.7, 1,000,000 of magnitude 11.0, and 2,000,000 of magnitude 11.9. Although uncertain, it is suggested that there are about eighteen millions of stars visible in a telescope of 15 inches aperture, i.e. down to about the fifteenth magnitude.

The distribution of various spectral types has also been considered, and the most striking fact is the preponderance of stars of class "A" and "K" (Harvard), which in a

general classification may be taken as typical spectra, the others being simply modifications of these. Many other extremely interesting facts have been elicited during the discussion, but they are too numerous to mention here.

REPORT OF THE WINDSOR, N.S.W., OBSERVATORY.—Mr. Tebbutt's report of the work performed at this observatory (Windsor, N.S.W.) during 1902 deals chiefly with meridian observations for the determination of local time and star places. Most of the extra-meridian work mentioned has already been published in the *Astronomische Nachrichten*, and includes observations of minor planets (for positions) and Perrine's comet (1902 b). The reduced measures of fifty-four of the double-stars given in Inne's "Reference Catalogue," involving 1757 settings for position angle and 1503 for distance, have been communicated to the Royal Astronomical Society. The local meteorological results, given in the report, include monthly returns of temperature and rainfall observations, and show that the number of inches, recorded by a rain-gauge placed about 7 feet above the ground, is less than for any year since 1863, being, in fact, about 14.5 inches below the average for forty years. A number of comparisons of the temperatures recorded by two thermometers, one in a Greenwich the other in a Stevenson screen, showed that an excess amounting to between one and two degrees was registered by the former.

A FRENCH-CHINESE CALENDAR.—The "Calendrier Annuaire" for 1904, compiled at the Li-Ka-Wei Observatory, and published at the price of one dollar by the Catholic Mission at Shanghai, is an interesting calendar containing many astronomical, meteorological and physical tables.

The calendar is printed in French, but all proper names and technical terms are also given in Chinese characters and words. Among the more important matters dealt with there occur a lucid explanation of the Chinese calendar, many astronomical tables and explanatory notes, tables for the conversion of Chinese and Japanese standards into European equivalents, facts regarding the population, area and political relations of China, and a number of tables and curves relating to the meteorology of the Chinese Empire.

A BRIGHT BOLIDE.—A remarkable bolide was observed by Mr. W. E. Rolston at Fulham at about 8h. 27m. p.m. on January 9. It appeared at a point situated at about  $\alpha=102^\circ$ ,  $\delta=+18^\circ$ , and slowly travelled towards the constellation Cancer, leaving a bright, scintillating, reddish trail. When near to the point  $\alpha=112^\circ$ ,  $\delta=+18^\circ$  (approx.) the head slowly swelled out into a bulbous shape having a yellowish-red hue, became considerably brighter than Jupiter, and then suddenly disappeared. The duration of the complete phenomenon was about five or six seconds.

### THE PHYSICAL LABORATORY AT LEYDEN.

AN account of this laboratory, published in *NATURE* of August 13, 1896 (vol. liv. p. 345), dealt with the inception of the cryogenic department in 1883, and traced its development up to date. It is the purpose of this note to continue the account to the present time, both as regards the more important changes and improvements in the cryogenic department itself, and also in the remaining divisions of the laboratory.

As before, the communications continue to give an almost complete account of the results of the practical work carried out, together with certain more theoretical papers in direct connection with this. Since 1898, the Royal Academy of Amsterdam has published its *Proceedings* in English as well as in Dutch, so that the communications are now corrected reprints of the *Proceedings*. Some idea may be gathered of the increasing output of work when it is noted that in 1896 the current number of the communications was twenty-three, while it has now risen to eighty-eight.

This increasing productivity is mainly due to the much improved appliances, both for manipulation and measurement, which have been developed during the last ten years. Although the original system of three main cycles containing methyl chloride, ethylene and oxygen has been retained, almost every part has been improved and enlarged, so that the ease and rapidity of working are much enhanced. In